

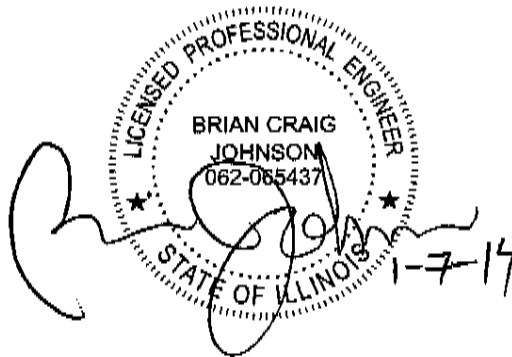


# **Forensic Building Science, Inc.**

## **Storm Damage Report**

For

Southgate Townhome Association  
Multiple addresses on East Ave,  
Butternut Lane,  
Wysteria Lane,  
Teak Lane,  
Ivy Court,  
and Acorn Drive  
Streamwood IL, 60107



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Design Firm Registration 184006695 expires 4/30/15

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Project Address:

**Southgate Townhome Association, Vanguard Community Management**

**Multiple Addresses**

**Streamwood IL, 60107**

**Cook County**

**FIELD REPORT FOR INITIAL STORM DAMAGE INVESTIGATION**

**Background Information:**

1.0

Forensic Building Science, Inc. was retained by Childress Duffy Law Firm to provide an inspection of the above-mentioned properties to ascertain the extent of damage caused by wind and hail, which was reported to have occurred on April 5, 2010. Our inspection was limited to damage to the roofs, exterior cladding, windows and some attics.

1.1

Reference information on storm (1" to 1.5" hail, and wind gust speeds of 66 mph):

- <http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=224219>
- <http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=224226>
- <http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=224230>
- <http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=224232>

1.1.1

Forensic Weather Consultants, LLC was asked to perform an in depth analysis of the weather conditions and hail occurrence for the period of April 4 – 5, 2010 in the vicinity of Southgate Townhome Association in Streamwood, Illinois. The following was reported:

*“On April 5, 2010, Doppler radar images that were zoomed in over the incident location and nearby surface observations indicated that... A supercell thunderstorm, defined by the American Meteorological Society (A.M.S.) as "an often dangerous convective storm that consists of a single, quasi-steady rotating updraft", moved over the incident area from approximately 10:01 p.m. through 10:49 p.m. During this time, the strongest part of the thunderstorm to affect the incident location occurred from approximately 10:24 p.m. through 10:32 p.m. A hook echo, defined by the A.M.S. as "a pendant, curve-shaped region of reflectivity caused when precipitation is drawn into the cyclonic spiral of a mesocyclone", moved over the incident location between approximately 10:27 p.m. and 10:33 p.m. A hook echo often indicates the presence of a tornado or that one could form at any time. Large, severe hail often occurs in supercell thunderstorms.”*

*“The most severe part of the thunderstorm moved over the incident location between the radar image times above, and below, (between 10:26-10:31 p.m.). Through examination of the data and extrapolation of the images as it passed over the incident location, it is my opinion that the Probability Of Severe Hail (POSH) was 100% over the incident location and the Maximum Estimated Hail Size (MEHS) was approximately 1.68 - 2.41” when the most severe part of the storm passed over the incident location. However, due to melting as the hail fell through the atmosphere, the hail size likely decreased by approximately 0.25”. Therefore, hail sizes at the ground were between 1.43 - 2.16” in diameter (walnut/ping pong ball to hen egg sized hail).”*

1.1.2 Forensic Building Science researched possible storm events that may have occurred either prior to the reported date of loss or after the date of loss and prior to our inspection. The information was taken from the National Climactic Data Center (NCDC) website database. The range of dates researched was from July 1, 2003 to July 1, 2013. The following information was found:

A storm event occurred on August 1, 2003 in Streamwood, Illinois with 0.75” to 1.25” magnitude hail. Reference information on storm:

- <http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=5377697>
- <http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=5368692>

A storm event occurred on May 9, 2004 in Streamwood Illinois with 1.0” magnitude hail. Reference information on storm:

- <http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=5396666>

A storm event occurred on September 22, 2006 in Streamwood Illinois with 0.75” magnitude hail. Reference information on storm:

- <http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=5535151>

In our opinion, to a reasonable degree of engineering certainty, the damages observed at the complex were more likely than not to have occurred because of the April 5, 2010 storm event and not the 2003, 2004 and 2006 storm events. In particular, the impact damage on the shingles did not show weathering consistent with an event that occurred more than seven years before we inspected the roofs.



Google Earth Imagery

On July 30<sup>th</sup>, July 31<sup>st</sup>, August 1<sup>st</sup>, August 20<sup>th</sup>, August 21<sup>st</sup>, November 21<sup>st</sup>, November 22<sup>nd</sup>, and December 4, 2013 Forensic Building Science visited the site to take photos and document damaged locations. Forensic Building Science conducted inspections of all the dwellings on the property with more thorough inspections of five of the buildings. Roofs that were reported to have been replaced were omitted from our inspection. The photo logs are included with this report.

The buildings were converted from apartments to condominiums in 2000. At that time the roofs and exterior siding were replaced.

1.2 The following documents have been reviewed:

- 560 photographs from Madsen, Kneppers & Associates Inc. dated March 1<sup>st</sup> to October 11<sup>th</sup>, 2011.
- American Building Contractors, Inc. Estimate (\$2,010,937.53) dated August 6, 2010, 16 photos.
- 57 color photographs from Cook, not dated.
- Madsen, Kneppers & Associates, Inc. estimate (\$242,761.07) dated April 2, 2011, 6 photographs.
- Madsen, Kneppers & Associates, Inc. revised estimate (\$965,914.44) dated August 25, 2011.

- Photos from Bruno, 6 photos, dated February 18, 2013.
- Letter from Childress Duffy, dated July 24, 2013.
- Pictures of hail damage, dated April 5, 2010.
- Siebert Engineering Inc. report dated October 17, 2010, 11 photos.
- Streamwood Code Handout dated 2010.
- Southgate Deposition Transcript John Peterson dated March 14, 2013.
- Southgate Exhibits to Deposition Transcript John Peterson dated March 14, 2013.
- Southgate Exhibits to Juergen Fuss Deposition dated October 10, 2013.
- Southgate Exhibits to James Stefanek Deposition dated October 10, 2013.
- Southgate Deposition Transcript James Stefanek dated October 10, 2013.
- Southgate Deposition Transcript Juergen Fuss dated October 11, 2013.
- Forensic Weather Consultants, LLC report dated November 15, 2013.
- Village of Streamwood Roofing Ordinance, not dated.

According to the Cook County website, the 4-plexes on the property were constructed around 1989 and range from 1,133 to 1,286 square feet.

1.2

The property consists of fifty six wood-framed 4-plex townhomes each with an attached garage. There is also a community club house and pool. The buildings are two-story structures. The roofs are covered with asphalt three-tab shingles and the exterior walls are vinyl siding. There are gutters and downspouts on each building. Thickness measurements of the shingles found that the majority of the shingles were a 25-year shingle. In some cases, there were 30-year shingles. These typically were the red/brown blend colored shingles. These shingles did not exhibit as much hail damage.

1.3

At the time of our inspection, 17 roofs including the clubhouse siding were reported to have been replaced subsequent to the subject storm.

1.4

1.5

The following additional documents were used for reference:

- 1980 Uniform Building Code.
- 2006 International Building Code.
- CertainTeed Shingle Applicators Manual, 10<sup>th</sup> edition.
- Haag Education Haag Certified Roof Inspector Program, Residential Edition.
- Ventilation and Moisture Control for Residential Roofing, ARMA Technical Bulletin 209, retrieved 6-26-12.
- Nail Application of Asphalt Shingles for New and Re-cover Roofing, ARMA Technical Bulletin 221, retrieved 6-26-12.
- Asphalt Roofing Shingles: Composition, Performance, Function, and Standards, Raymond McNulty, January 2000 Interface magazine.
- Hot Weather Recommendations for Storage and Application of Asphalt Roofing Shingles, <http://www.asphaltroofing.org/hot-weather-recommendations-storage-and-application-asphalt-roofing-shingles>, retrieved 01-7-14.
- Re-roofing: Tear-off vs. Re-Cover, ARMA Technical Bulletin 223, <http://www.asphaltroofing.org/re-roofing-tear-vs-re-cover>, retrieved 01-07-14.

- What's the value of Ventilation?, Cash and Lyon, Professional Roofing Magazine, March 2002, <http://www.professionalroofing.net/archives/past/mar02/feature2.asp>
- ASTM D6381 - 08 Standard Test Method for Measurement of Asphalt Shingle Mechanical Uplift Resistance.
- ASTM D3161 Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).
- ASTM D7158-11 Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method).
- Self-sealing Asphalt Shingles – Technical Bulletin 3.0 – Is My Roof Wind Damaged? Is Wind the Proximate Cause, Donan Engineering, January 2009.
- CertainTeed Shingle Applicators Manual, 10<sup>th</sup> edition.
- Assessing water damage to gypsum board, Gypsum Association GA-231-06.
- Relationship between Moisture Content and Mechanical Properties of Gypsum Sheathing- Phase 2 Research, by Alex P. McGowan, from the 11<sup>th</sup> Canadian Conference on Building Science and Technology, Banff, Alberta, 2007.
- Panel Edge Support for Narrow Width Roof Sheathing, APA Technical Note R275A, Aug 1997.
- Current Tyvek Installation Instructions, DuPont. Feb 2012.
- Vinyl Siding Installation Manual, *Vinyl Siding Institute*, Dec 2011.

1.6 Forensic building Science personnel present:

- Tom Irmiter, President Forensic Building Science, Inc. (July 30<sup>th</sup>, 2013)
- Joshua Long, Field Technician. (July 30<sup>th</sup>, July 31<sup>st</sup>, August 1<sup>st</sup>, August 20<sup>th</sup>, August 21<sup>st</sup>, 2013)
- Jim Irmiter, Field Technician. (July 30<sup>th</sup>, July 31<sup>st</sup>, August 1<sup>st</sup>, August 20<sup>th</sup>, August 21<sup>st</sup>, November 21<sup>st</sup>, November 22<sup>nd</sup>, 2013)
- Brian Johnson P.E. (December 4<sup>th</sup>, 2013)

1.7

Inspection data:

- Area is surrounded by single- and multi-family residential properties and some commercial properties consistent with the definition of Exposure B in ASCE 7.
- A resident reported the apartment complex was built around 1988-1989 and the hail storm that damaged her residence and the neighborhood occurred on April 5, 2010. Many homes in the neighborhood have gotten new roofs since then.
- Site surrounded by many large trees.
- Roof sheathing is plywood and OSB.
- Roofing type: Three-tab asphalt shingles.
- Shingle size: 36" wide.
- Shingle Exposure: generally 5".
- Roof pitch: approximately 6" / 12".
- Drip edge: Installed.
- Soffit overhang 12".
- One layer of shingles.
- Ice and water shield on some roofs, others without.
- Gutter apron on all buildings.
- Typically a space between the apron and the underlayment, exposing decking.
- Grey and Black shingles 25 year.



- Red/Brown shingles 30 year.
- Crickets: None, chimneys mounted to the rake edge generally.
- Exposed nails: exposed nails observed where shingles have been broken and/or displaced.
- Varying amounts of hail damage found at all roofs.
- Impact damage to vinyl siding, soft metals, window trim, screen, and HVAC condenser coils on all buildings. Some AC units with protective coverings, others on leeward side (protected by the building).
- Detached siding, creased and torn shingles and missing shingles was consistent with wind damage.
- Tyvek behind vinyl siding.
- Fiberboard sheathing behind Tyvek (not fire rated).
- Attic firewalls at unit separations showed some water damage.
- Isolated areas of spongy/soft roof decking found on many roofs.

### **Site Observations**

- 2.0 Design and construction of the buildings is similar in all cases. Roofs are gable-style with
- 2.1 varying levels at roof jumps.
- 2.2 While there are no manufacturers specifications identified, installation was consistent with other roofs of this type and design we have inspected.
- 2.3 Generally, the types of damage we observed on most building, which consisted of the following was consistent with the reported storm event:
- Impact damage to metal, lead and plastic appurtenances on the roof.
  - Impact damage to shingles of roof. Some impact damage was so severe that the fibers of the mat of the shingle were visible.
  - Chipped shingles.
  - Creased shingles.
  - Broken and torn shingles at rake edge and in the field.
  - Unsealed shingles.
  - Missing and displaced shingles.
  - Non-matching replacement shingles have been used in some areas for temporary repairs.
  - Impact damage to gutters and downspouts.
  - Impact damage to metal trim.
  - Impact damage to vinyl siding.
  - Impact damage to HVAC units.
  - Impact damage to window trim and screens.
- 2.4
- Impact damage to column wraps.
  - There are some trees in close contact with some of the buildings. This is unrelated to the loss and we advocate trimming the trees to prevent damage to the buildings.

### **Roof and Siding Inspection Methodology**

Complete roof inspections were performed on five of the fifty-six dwellings at the

complex. These buildings were 225 – 231 Teak Lane (Building 42), 216 – 222 Teak Lane (Building 35), 248 – Butternut Lane (Building 7), 201 – 203 Ivy Court and 527 – 531 East Avenue (Building 30) and 533 – 539 East Avenue (Building 31) (see photo logs sorted by building). On these five buildings, full inspections were performed in order to document the extent of wind and impact damage to roofs, siding, and soft metals. These inspections consisted of physically circling every impact locations on the roof, siding, soft metals and windows.

Test squares were not used to quantify the damages. Starting at the ridgeline on each roof and working north to south or east to west depending on the direction of the building, we worked across the roof slope from top to bottom in three to four foot increments circling each impact location or displaced shingle. This method was used to inspect 100% of the roof on each slope on the five buildings listed above. A representative number of photos were taken. On the remaining buildings, the same procedures were used but not every impact location was circled or counted. Each full inspection took about four person hours. Each limited inspection took about 1.25 person hours.

On all other inspected buildings, limited inspections were done and a representative sample of damages similar to those observed on the full inspections was recorded. The limited inspections were performed by accessing the roof of each building to briefly determine the approximate amount of damage to each roof.

Damage on all roofs was consistent with the storm event. The 30- year shingles generally performed better than the 25- year shingles, and the extent of damage varied as one would expect. See photo logs sorted by building for documented storm damage.

Impact damage to siding sections and soft metals was also quantified for each building. The siding damage was quantified by performing a walk around of each individual building.



248 – 254 Butternut Lane (Building 7):

2.4.1



- Front elevations face east and west (garage and front doors)
- Multiple impacts to various metal wrap on the west facing side.
- Multiple impacts to window trim on the west facing side.
- Multiple impacts to HVAC condenser coils on the north facing side.
- Impact damage on roof vents – more damage on west facing vents.
- 3 impacts identified on the west facing vinyl siding.
- 2 impacts identified on the north facing vinyl siding.
- 20+ impacts identified on the west facing lower right elevation roof.
- 10+ impacts identified on the east facing lower right elevation roof.
- 5+ impacts identified on the lower west facing left elevation.
- 5+ impacts identified on the lower east facing left elevation roof.
- 5+ impacts identified on the upper west facing roof.
- 5+ impacts identified on the upper east facing roof.

201 – 203 Ivy Court and 527 – 531 East Avenue (Building 30):

2.4.2



- Front elevations face north and south (garage and front doors)
- Impact damage to gutters and downspouts.
- Rust stains on chimney cap.
- Impact damage to metal wrap on back elevation.
- Impact damage to metal trim.
- Impact damage to roof vents.
- Torn shingles.
- 32 impacts identified on the west facing vinyl siding.
- 1 impact identified on the south facing vinyl siding.
- 10+ impacts identified on the north facing lower right elevation roof.
- 5+ impacts identified on the south facing lower right elevation roof.
- 5+ impacts identified on the north facing lower left elevation roof.
- 5+ impact identified on the south facing lower left elevation roof.
- 1 impact identified on the upper roof slopes.
- Multiple soft spots on roof deck.

533 – 539 East Avenue (Building 31):

2.4.3



- Front elevations face northwest and southeast.
- West and Southwest Multiple impacts to metal wrap.
- Multiple impacts to gutter downspouts.
- Impact damage to metal flashing.
- Severe impact damage to roof vents – a majority of the damage was on the northwest facing side.
- Torn shingles.
- Tree in contact with roof.
- Temporary repair work done to shingles with caulk and nails.
- 5 impacts identified on the southwest facing vinyl siding.
- 1 impact identified on the northwest facing vinyl siding.
- 5+ impacts on the northwest facing front-left elevation roof.
- 20+ impacts identified on the northwest facing lower left elevation roof.
- 10+ impacts identified on the southeast facing lower left elevation roof.
- 5+ impacts identified on the northwest facing front-right elevation roof.
- 20+ impacts identified on the northwest facing lower right elevation roof.
- 20+ impact identified on the southeast facing lower right elevation roof.
- 20+ impacts identified on the northwest facing upper roof.
- 20+ impacts identified on the southeast facing upper roof.

216 – 222 Teak Lane (Building 35):

2.4.4



- Front elevations face southwest and northeast.
- West impact damage to roof vents.
- Unsealed shingle tabs.
- 17 impacts identified on the northwest facing vinyl siding.
- 10 + impacts identified on the southwest facing lower left elevation roof.
- 5+ impacts identified on the northeast facing lower left elevation roof.
- 10+ impacts identified on the southwest facing lower right elevation roof.
- 10+ impacts identified on the northeast facing lower right elevation roof.
- 20+ impacts identified on the upper southwest facing roof.
- 25+ impacts identified on the upper northeast facing roof.

2.4.5

225 – 231 Teak Lane (Building 42):



- Front elevations face northeast and southwest.
- Multiple impacts identified to HVAC condenser coils.
- Multiple impacts identified on metal wrap.
- Multiple impacts identified on gutter downspouts.
- Multiple impacts identified on metal trim.



- Multiple impacts identified on with and door screens.
- Severe impact damage to roof vents.
- Impact damage to through the matt was identified on multiple shingles.
- 9 impacts identified on the northwest facing siding.
- 1 impacts identified on the southwest facing siding.
- 20+ impacts were identified on the southwest facing upper roof.
- 20+ impacts were identified on the lower northeast facing roofs.
- 65-70 impacts identified on roof.

### **Limited Building Inspections**

2.5 On the following buildings, inspections were limited to documenting damage consistent with damages recorded on the initial five buildings where detailed full inspections were performed. Photo logs were created for each building. The following observations were made:

Building 1 (202 – 206 Butternut Lane/493 – 497 East Avenue):

- 2.5.1
- The roof on this building has been replaced since the storm event.
  - Impact damage to HVAC condenser coils.
  - Impact damage to gutter downspouts.
  - Impact damage to metal wrap.
  - 11 impacts identified on the west facing vinyl siding.
  - 3 impacts identified on the north facing vinyl siding.

2.5.2 Building 2 (208 – 214 Butternut Lane):

- Impact damage to metal wrap.
  - Impact damage to window trim.
  - Impact damage to gutter downspouts.
  - Impact damage to HVAC condenser coils.
  - Black three-tab asphalt shingles.
  - Minor damage to one shingle from foot traffic in one location.
  - Impact damage to roof vents.
  - Missing one shingle tab on upper roof.
- 2.5.3
- Estimated number of damaged shingles damaged by hail was no less than 5.
  - 4 impacts identified on the west facing vinyl siding.

Building 3 (216 – 222 Butternut Lane):

- Impact damage to gutter downspouts.
- Impact damage to metal wrap.
- Grey three-tab asphalt shingles.
- 3-under driven nails through shingles.
- 3 shingles with Mechanical damage.
- Torn and chipped shingles.
- Organic growth on shingles.
- Repair work with caulk around roof vents.
- Impact damage to roof vents.

- Impact damage to shingles.
- 7 impacts identified on the west facing vinyl siding.

Building 4 (224 – 230 Butternut Lane):

2.5.4

- Impact damage to window screens.
- Impact damage to metal wrap.
- Impact damage to window trim.
- Impact damage to HVAC condenser coils.
- Red three-tab asphalt shingles.
- Impact damage to roof vents.
- Rust staining to flashing around chimney.
- Torn shingles.
- Tree in contact with roof.
- Minor impact damage to shingles.
- 5 impacts identified on the west facing vinyl siding.
- 1 impacts identified on the south facing vinyl siding.

Building 5 (232 – 238 Butternut Lane):

2.5.5

- Impact damage to metal wrap.
- Impact damage to window trim.
- Black three-tab asphalt shingles.
- Under driven fasteners in shingles.
- Mechanical damage to shingles.
- Impact damage to roof vents.
- Impact damage to shingles.
- 2 impacts identified on the west facing vinyl siding.

2.5.6

Building 6 (240 – 246 Butternut Lane):

- Impact damage to metal wrap.
- Impact damage to window trim.
- Impact damage to HVAC condenser coils.
- Grey three-tab asphalt shingles.
- Organic growth on shingles.
- Under driven fasteners in shingles.
- Mechanical damage to shingles.
- Impact damage to roof vents.
- Mechanical damage to siding.
- Estimated number of damaged shingles damaged by hail was no less than 30.
- 4 impacts identified on the west facing siding.
- 2 impacts identified on the north facing vinyl siding.
- 2 impacts identified on the east facing vinyl siding.

2.5.7

Building 8 (256 – 262 Butternut Lane):

- Impact damage to gutter downspouts.
- Impact damage to metal wrap.



- Impact damage to window trim.
- Impact damage to HVAC condenser coils.
- Red/brown three-tab asphalt shingles.
- Torn shingle tabs.
- Chipped shingle tabs.
- Estimated number of damaged shingles damaged by hail was no less than 10.
- Impact damage to roof vents.
- Impact damage to metal flashing.
- Organic growth on shingles.
- Temporary repair work to shingles.
- Under driven nails in shingles.
- 6 impacts identified on the west facing vinyl siding.
- 1 impacts identified on the south facing vinyl siding.

Building 9 (264 – 270 Butternut Lane):

2.5.8

- The roof on this building has been replaced since the storm event.
- Impact damage to metal wrap.
- Impact damage to gutter downspouts.
- Minimal impact damage to HVAC condenser coils.
- 9 impacts identified on the west facing vinyl siding.
- 1 impacts identified on the north facing vinyl siding.

2.5.9

Building 10 (272 – 278 Butternut Lane):

- The roof on this building has been replaced since the storm event.
- Impact damage to window trim.
- Impact damage to metal wrap.
- Impact damage to window screens.
- Impact damage to gutter downspouts.
- 7 impacts identified on the west facing vinyl siding.

2.5.10

Building 11 (280 – 286 Butternut Lane):

- Impact damage to metal wrap.
- Tan three-tab asphalt shingles.
- Impact damage to roof vents.
- Estimated number of damaged shingles damaged by hail was no less than 20.
- Tree in contact with roof.
- Some impact damage to shingles.
- 8 impacts identified on the west facing vinyl siding.

2.5.11

Building 12 (281 – 287 Butternut Lane):

- Impact damage to gutters and downspouts.
- Impact damage to metal trim.
- Impact damage to metal wrap.
- Red three-tab asphalt shingles.
- Minimal impact damage to HVAC condenser coils.

- Missing shingle tabs.
- Impact damage to roof vents.
- Some blistering on shingles.
- Torn shingle tabs.
- Temp repairs to shingles.
- Tree in contact with roof.
- Estimated number of damaged shingles damaged by hail was no less than 10.
- 5 impacts identified on the west facing vinyl siding.

Building 13 (273 – 279 Butternut Lane):

- 2.5.12
- The roof on this building has been replaced since the storm event.
  - Impact damage to gutter downspouts.
  - Impact damage to HVAC condenser coils.
  - 3 impacts identified on the west facing vinyl siding.

Building 14 (265 – 271 Butternut Lane):

- 2.5.13
- Impact damage to HVAC condenser coils.
  - Impact damage to gutter downspouts.
  - Impact damage to window trim.
  - Impact damage to metal wrap.
  - Impact damage to window screens.
  - Impact damage to metal flashing.
  - Grey three-tab asphalt shingles.
  - Impact damage to roof vents.
  - Significant granule loss in gutters.
  - Estimated number of damaged shingles damaged by hail was no less than 10.
  - 11 impacts identified on the west facing vinyl siding.
- 2.5.14
- 1 impact identified on the east facing vinyl siding.

Building 15 (301 – 307 Teak Lane):

- 2.5.15
- Roof and roof appurtenances appear new, no damage observed to roof.
  - Impact damage to gutters and downspouts.
  - Impact damage to metal trim.
  - Impact damage to window screens.
  - Impact damage to metal wrap.
  - Red three-tab asphalt shingles-no damage.
  - 16 impacts identified on the west facing vinyl siding.
  - 2 impacts identified on the north facing vinyl siding.

2.5.16 Building 16 (257 – 259 Butternut Lane/309 – 313 Teak Lane):

- The roof on this building has been replaced since the storm event.
- 7 impacts identified on the west facing vinyl siding.

Building 17 (233 – 235 Butternut Lane/308 – 312 Teak Lane):

- Impact damage to metal wrap.
- Impact damage to metal trim.

- Minimal impact damage to HVAC condenser coils.
- Impact damage to gutter downspouts.
- Impact damage to window screens.
- Red three-tab asphalt shingles.
- Severe impact damage to roof vents.
- Chipped shingles.
- Estimated number of damaged shingles damaged by hail was no less than 10.
- 10 impacts identified on the west facing vinyl siding.

Building 18 (225 – 231 Butternut Lane):

- 2.5.17
- Impact damage to gutters and downspouts.
  - Minimal impact damage to HVAC condenser coils.
  - Impact damage to metal wrap.
  - Impact damage to window screens.
  - Tan three-tab asphalt shingles.
  - Severe impact damage to roof vents.
  - Severe foot traffic marks on roof.
  - Missing shingle tabs.
  - Significant granule loss in gutters.
  - Estimated number of damaged shingles damaged by hail was no less than 15.
  - Soft spots in roof deck.
  - 6 impacts identified on the west facing vinyl siding.

2.5.18

Building 19 (217 – 223 Butternut Lane):

- Minimal impact damage to HVAC condenser coils.
- Impact damage to gutters and downspouts.
- Impact damage to window trim.
- Black three-tab asphalt shingles.
- Severe impact damage to roof vents.
- Estimated number of damaged shingles damaged by hail was no less than 15.
- Chipped shingles.
- Multiple soft spots in roof deck.

2.5.19

- 6 impacts identified on the west facing vinyl siding.
- 1 impact identified on the north facing vinyl siding.

Building 20 (209 – 215 Butternut Lane):

- Impact damage to window trim.
- Impact damage to gutter downspouts.
- Impact damage to metal pillar wrap.
- Impact damage to HVAC condenser coils.
- Torn single tabs.
- Red three-tab asphalt shingles.
- Organic growth on shingles.
- Severe impact damage to roof vents.
- Estimated number of damaged shingles damaged by hail was no less than 10.

- Temp repair work with caulk to shingles.
- 7 impacts identified on the west facing vinyl siding.
- 2 impacts identified on the north facing vinyl siding.

Building 21 (201 – 203 Butternut/503 – 507 East Avenue):

- The roof on this building has been replaced since the storm event.
- Impact damage to metal wrap.
- Impact damage to gutter downspouts.
- 29 impacts identified on the west facing vinyl siding.

Building 22 (509 – 515 East Avenue):

- The roof on this building has been replaced since the storm event.
- Impact damage to gutter downspouts.
- Severe impact damage to HVAC condenser coils.
- Rusting to chimney cap.
- Missing vinyl siding.
- 26 impacts identified on the west facing vinyl siding.

Building 23 (517 – 521 East Avenue and 200 – 202 Ivy Court):

- Impact damage to HVAC condenser coils.
- Impact damage to gutter downspouts.
- Red three-tab asphalt shingles.
- Severe impact damage to roof vents.
- Some mechanical damage to shingles.
- Estimated number of damaged shingles damaged by hail was no less than 5.
- 18 impacts identified on the west facing vinyl siding.

Building 24 (208 – 214 Ivy Court):

- Impact damage to window screens.
- Impact damage to window trim.
- Impact damage to gutter downspouts.
- Impact damage to HVAC condenser coils.
- Grey three-tab asphalt shingles.
- Severe impact damage to roof vents.
- Missing shingle tabs.
- Temp repair work with caulk to shingle tabs.
- Soft/spongy roof deck.
- Chipped shingle tabs.
- Estimated number of damaged shingles damaged by hail was no less than 20.
- 12 impacts identified on the west facing vinyl siding.
- 2 impacts identified on the north facing vinyl siding.

Building 25 (216 – 222 Ivy Court):

- Impact damage to window trim.
- Impact damage to gutter downspouts.
- Impact damage to HVAC condenser coils.

- At chimney intersection staining down vinyl siding.
- Impact damage to window screens.
- Red three-tab asphalt shingles.
- Missing shingle tabs.
- Chipped shingle tabs.
- Torn shingle tabs.
- Severe impact damage to roof vents.
- Impact damage to metal flashing.
- Unsealed shingle tabs.
- Estimated number of damaged shingles damaged by hail was no less than 10.
- 9 impacts identified on the west facing vinyl siding.

Building 26 (224 – 230 Ivy Court):

- 2.5.25
- The roof on this building has been replaced since the storm event.
  - Impact damage to metal wrap.
  - 32 impacts identified on the west facing vinyl siding.

Building 27 (225 – 231 Ivy Court):

- 2.5.26
- Impact damage to gutter downspouts.
  - Impact damage to metal wrap and trim.
  - Impact damage to HVAC condenser coils.
  - Grey three-tab asphalt shingles.
  - Severe impact damage to roof vents.
  - Rust staining on chimney caps.
  - Some granule loss in gutters.
  - Torn shingle tabs.
  - Estimated number of damaged shingles damaged by hail was no less than 10.
- 2.5.27
- 8 impacts identified on the west facing vinyl siding.

Building 28 (217 -223 Ivy Court):

- Impact damage to window trim.
  - Impact damage to metal wrap.
  - Impact damage to gutter downspouts.
  - Black three-tab asphalt shingles.
  - Severe impact damage to roof vents.
- 2.5.28
- Estimated number of damaged shingles damaged by hail was no less than 20.
  - 5 impacts identified on the west facing vinyl siding.

Building 29 (209 – 215 Ivy Court):

- Impact damage to HVAC condenser coils.
- Impact damage to metal wrap.
- Impact damage to window trim.
- Red three-tab asphalt shingles.
- Replacement shingles.
- Severe impact damage to roof vents.

- Torn shingle tabs.
- Soft spots in roof deck.
- Estimated number of damaged shingles damaged by hail was no less than 10.
- 12 impacts identified on the west facing vinyl siding.

Building 32 (541 – 547 East Avenue):

- The roof on this building has been replaced since the storm event.
- Impact damage to window trim.
- 2.5.29 • Impact damage to gutter downspouts.
- Impact damage to metal wrap.
- Impact damage to window screens.
- Rust staining on chimney cap and vinyl siding.
- Minimal impact damage to HVAC condenser coils.
- 17 impacts identified on the southwest facing vinyl siding.
- 2 impacts identified on the northwest facing vinyl siding.

Building 33 (561 – 563 East Avenue and 202 – 206 Teak Lane):

- 2.5.30 • Red three-tab asphalt shingles.
- Displaced shingles.
- Impact damage roof vents.
- Chipped shingle tabs.
- Soft spots in roof deck.
- Missing shingle tabs.
- Estimated number of damaged shingles damaged by hail was no less than 10.
- 17 impacts identified on the northwest facing vinyl siding.

2.5.31

Building 34 (208 – 214 Teak Lane):

- Impact damage to metal wrap.
- Gray three-tab asphalt shingles.
- Impact damage to flashing.
- Unsealed shingle tabs.
- Missing shingle tabs.
- Impact damage to roof vents.
- Impact damage to window screens.
- Granule loss in gutters.
- 2.5.32 • Estimated number of damaged shingles damaged by hail was no less than 15.
- 25 impacts identified on the northwest facing vinyl siding.

Building 36 (224 – 230 Teak Lane):

- Impact damage to metal wrap.
- Impact damage to HVAC condenser coils.
- Red three-tab asphalt shingles.
- Missing shingle tabs.
- Impact damage to roof vents.
- Chipped shingles.



- Impact damage to metal flashing.
- Estimated number of damaged shingles damaged by hail was no less than 15.
- 8 impacts identified on the northwest facing vinyl siding.

Building 37 (232 – 238 Teak Lane):

2.5.33

- Impact damage to window trim.
- Impact damage to gutter downspouts.
- Impact damage to metal wrap.
- Impact damage to window screens.
- Impact damage to HVAC condenser coils.
- Chimney intersection staining down vinyl siding.
- Grey three-tab asphalt shingles.
- Impact damage to roof vents.
- Estimated number of damaged shingles damaged by hail was no less than 30.
- 16 impacts identified on the northwest facing vinyl siding.
- 1 impact identified on the southwest facing vinyl siding.

Building 38 (240 – 246 Teak Lane):

2.5.34

- Impact damage to metal wrap.
- Impact damage to window screens.
- Impact damage to gutter downspouts.
- Red three-tab asphalt shingles.
- Finger loose shingle tabs.
- Severe impact damage to roof vents.
- Impact damage to chimney cap.
- Estimated number of damaged shingles damaged by hail was no less than 10.
- 11 impacts identified on the west facing vinyl siding.
- 1 impact identified on the south facing vinyl siding.

2.5.35

Building 39 (248 – 254 Teak Lane):

2.5.36

- Impact damage to metal pillar wrap.
- Impact damage to metal trim.
- Impact damage to gutters and downspouts.
- Impact damage to HVAC condenser coils.
- Impact damage to vinyl siding.
- Impact damage to window screens.
- Black three-tab asphalt shingles.
- Severe impact damage to roof vents.
- Estimated number of damaged shingles damaged by hail was no less than 15.10 impacts identified on the west facing vinyl siding.

Building 40 (300 – 306 Teak Lane):

- Impact damage to HVAC condenser coils.
- Impact damage to metal wrap.
- Impact damage to gutter downspouts.

- Tan three-tab asphalt shingles.
- Impact damage to roof vents.
- Impact damage to metal flashing.
- Chipped shingle tabs.
- Estimated number of damaged shingles damaged by hail was no less than 15.
- 23 impacts identified on the west facing vinyl siding.

Building 41 (233 – 239 Teak Lane):

2.5.37

- Chimney intersection and staining down vinyl siding.
- Impact damage to gutter downspouts.
- Impact damage to window trim.
- Impact damage to window screens.
- Some impact damage to HVAC condenser coils.
- Impact damage to metal flashing.
- Red three-tab asphalt shingles.
- Under driven nails in shingles.
- Impact damage to roof vents.
- Temp repair work to shingles with caulk.
- Estimated number of damaged shingles damaged by hail was no less than 15.
- 1 impacts identified on the southwest facing vinyl siding.
- 10 impacts identified on the northwest facing vinyl siding.

2.5.38

Building 43 (217 – 223 Teak Lane):

- Impact damage to gutter downspouts.
- Impact damage to window screens.
- Impact damage to metal wrap.
- Impact damage to window screens.
- Black three-tab asphalt shingles.
- Soft spots in roof deck.
- Estimated number of damaged shingles damaged by hail was no less than 25.
- Impact damage to roof vents.
- Chipped shingles.
- Granule loss in gutters.

2.5.39

- 20 impacts identified on the northwest facing vinyl siding.
- 1 impacts identified on the southwest facing vinyl siding.

Building 44 (209 – 215 Teak Lane):

- Impact damage to HVAC condenser coils.
- Impact damage to metal trim.
- Impact damage to gutter downspouts.
- Impact damage to window screens.
- Impact damage to metal wrap.
- Grey three-tab asphalt shingles.
- Severe impact damage to roof vents.
- Missing shingle tabs.

- Missing metal trim.
- Organic growth on shingles.
- Estimated number of damaged shingles damaged by hail was no less than 25.
- 30 impacts identified on the northwest facing vinyl siding.
- 1 impact identified on the southwest facing vinyl siding.

Building 45 (201 – 203 Teak Lane and 571 – 575 East Avenue)

- 2.5.40
- The roof on this building has been replaced since the storm event.
  - Impact damage to HVAC condenser coils.
  - Impact damage to metal wrap.
  - Chimney intersection and staining down vinyl siding.
  - 4 impacts identified on the northwest facing vinyl siding.

Building 46 (577 – 583 East Avenue):

- 2.5.41
- Impact damage to window screens.
  - Impact damage to window trim.
  - Impact damage to gutter downspouts.
  - Impact damage to metal wrap.
  - Impact damage to window trim.
  - Grey three-tab asphalt shingles.
  - Severe impact damage to roof vents.
  - Missing shingle tabs.
  - Foot traffic on roof.
  - Soft spots in roof deck.
  - Estimated number of damaged shingles damaged by hail was no less than 15.
  - 1 impact identified on the northeast facing vinyl siding.
  - 9 impacts identified on the northwest facing vinyl siding.
  - 1 impact identified on the southeast facing vinyl siding.
- 2.5.42
- 1 impact identified on the southwest facing vinyl siding.

Building 47 (593 – 599 East Avenue):

- Impact damage to gutter downspouts.
- Red three-tab asphalt shingles.
- Impact damage to roof vents.
- Chipped shingles.
- Torn shingles.
- Temp repair work done to shingles with caulk.
- Rust staining on chimney cap.
- Missing shingle tab.
- Estimated number of damaged shingles damaged by hail was no less than 25.
- 5 impacts identified on the northwest facing vinyl siding.
- 2 impacts identified on the southwest facing vinyl siding.

Building 48 (332 – 338 Wisteria Drive):

- 2.5.43
- Impact damage to gutter downspouts.
  - Red three-tab asphalt shingles.
  - Impact damage to roof vents.
  - Chipped shingles.
  - Torn shingles.
  - Missing shingle tab.
  - Estimated number of damaged shingles damaged by hail was no less than 25.
  - 1 impact identified on the northwest facing vinyl siding.
  - 1 impact identified on the southwest facing vinyl siding.

Building 49 (324 – 330 Wisteria Drive):

- 2.5.44
- Impact damage to gutter downspouts.
  - Impact damage to metal wrap.
  - Grey three-tab asphalt shingles.
  - Impact damage to roof vents.
  - Tree in contact with roof.
  - Chipped shingle tabs.
  - Torn shingle tabs.
  - Estimated number of damaged shingles damaged by hail was no less than 15.
  - 17 impacts identified on the northwest facing vinyl siding.

Building 50 (316 – 322 Wisteria Drive):

- 2.5.45
- Impact damage to window screens.
  - Impact damage to metal wrap.
  - Tan three-tab asphalt shingles.
  - Organic growth on shingles.
  - Torn shingle tabs.
  - Impact damage to roof vents.
  - Missing shingle tabs.
  - Estimated number of damaged shingles damaged by hail was no less than 15.
- 2.5.46
- 23 impacts identified on the northwest facing vinyl siding.

Building 51 (308 – 314 Wisteria Drive):

- 2.5.47
- The roof on this building has been replaced since the storm event.
  - Impact damage to metal trim.
  - Impact damage to gutter downspouts.
  - Impact damage to HVAC condenser coils.
  - 30 impacts identified on the west facing vinyl siding.

Building 52 (302 – 306 Wisteria Drive and 200 – 202 Acorn Drive):

- The roof on this building has been replaced since the storm event.
- Impact damage to metal siding.
- Impact damage to gutter downspouts.
- Impact damage to HVAC condenser coils.

- Impact damage to window screens.
- Impact damage to metal wrap.
- 12 impacts identified on the west facing vinyl siding.
- 1 impact identified on the north facing vinyl siding.

Building 53 (319 – 325 Wisteria Drive):

- The roof on this building has been replaced since the storm event.
- Minimal damage to HVAC condenser coils.
- 2.5.48 • Impact damage to gutter downspouts.
- Impact damage to window trim.
- Impact damage to window screen.
- Impact damage to metal wrap.
- Chimney intersection and staining down vinyl siding.
- 11 impacts identified on the northwest facing vinyl siding.

Building 54 (301 – 303 Wisteria Drive/214 – 218 Acorn Drive):

- 2.5.49 • The roof does not appear to have been replaced.
- 8 impacts identified to west facing vinyl siding.

Building 55 (209 – 215 Acorn Drive):

- 2.5.50 • The roof on this building has been replaced since the storm event.
- An interior inspection was done at this location (see below).
- Impact damage to window trim.
- Lack of kick-out flashing at roof to chimney intersection and staining down vinyl siding.
- Impact damage to gutter downspout.
- Impact damage to HVAC condenser coils.
- 5 impacts identified on the west facing vinyl siding.
- 2.5.51 • 1 impact identified on the north facing vinyl siding.

Building 56 (201 – 207 Acorn Drive):

- The roof on this building has been replaced since the storm event.
- Impact damage to gutter and downspouts.
- Impact damage to one HVAC condenser coil.
- West and south some vinyl siding not fully attached.
- 3.0 • Impact damage to window screens on west elevation.
- 19 impacts identified on the west facing vinyl siding.

**Interior Inspection**

3.1

An interior inspection was performed in the attic of building 55 (209 – 215 Acorn Drive). The following observations were made:

Two types of roof sheathing were observed indicating roof is not original with the property and that sheathing replacement did occur with previous reroofing efforts.

“H”-clips were missing at intersections of plywood and OSB. This roof did not have any soft spots. Short sheathing piece is installed at the ridge, visually <24”, requiring H clips which are not installed throughout. The color of this sheathing piece in one location (Southgate 209-215 Acorn Drive Photo Log 7-30-13 & 08-21-13 JOL JDI Figure 29) shows pink colored plywood, possibly PK board or another unidentified type of fire retardant treated plywood. This material is clearly not four feet wide horizontal, measured from the wall edge. A roof vent penetration exists in this location where it is not permitted. Some of the piggyback truss verticals in this location is red, possibly another type of fire-retardant treated wood. Note that the lower truss is not colored and the upper piggyback chord is not colored.

Unit fire separation wall in the attic covered with 5/8” gypsum board. Gypsum board is water damaged. The material is stapled to the framing and is not taped.

### **Causation Statement**

Based upon physical evidence collected from the site inspection and roof assessment we have concluded that the roofs, roof appurtenances, siding, fascia, downspouts, some window screens, and some air conditioning condenser units on this property are damaged as a direct result of the wind and hail event that took place on April 5, 2010. The site-specific meteorological report provided by Forensic Weather Consultants, LLC substantiates the high probability of hail in between 1.43 - 2.16" in diameter on the reported date of loss. Indentations in shingles, granular loads, and impact damage to siding and soft metals were consistent with the reported hail size. Physical damage to the shingles in the form of substantial granular loss and exposed binder, mat and mat fibers have dramatically shortened the life of the shingle and created potential areas for water intrusion [see photos including but not limited to: 280-286 Butternut (building 11) Figure 33, 265-271 Butternut (building 14) Figure 41, 233-312 Teak (building 17) Figure 39, 209-333 Butternut (building 20) Figure 44-49, and 248-254 Teak (building 39) Figure 45 and 54 Figure 39. Soft spots at numerous locations on the roof decks are likely due to some water intrusion from the damaged shingles.

Physical damage to the roof vents caused directly by hail will require removal and replacement of the vents. Physical damage to siding and soft metals on as a direct result of the storm event requires replacement of these materials.

Damaged HVAC units on the ground are also present on the site. We attribute the damage to these units to the hail event.

Based upon a reasonable degree of engineering certainty, it is our opinion that the impact damages we observed to the exterior of the buildings are related to the storm event. On the reported date of loss, there was sufficient hail and wind to cause the observed damages.

Failure to replace the remaining damaged roofs and siding at the property will result in additional damage due to water intrusion. In our opinion, based on the age of the buildings and changes to the building and energy codes from the date of original construction to the date of loss, and specific requirements from the City of Streamwood,



additional costs to repair will be required to meet the current required code or manufacturer's installation instructions.

**City of Streamwood Requirements:**

Village Of Streamwood Code Requirements for Reroofing and Residing Ordinance

5.0

**Permit Procedures:**

5.1

1. Submit a completed permit application.
2. If a contractor is used, s/he must be licensed with the Village.

**Specifications:**

1. No more than two roofing applications are permitted. The existing 3/8 inch sheathing is generally not acceptable if it has been roofed twice in the past. However, if the owner and/or contractor finds the sheathing to be in sound condition, with no more than 50% of sheathing to be replaced, only the faulty material need be replaced with prior approval of the Village inspector. In this case, the roof shall be stripped down to the rafters and new 3/8 inch sheathing installed before roofing is installed (Section \*R-901.1).

**Comment:** Where examined, the existing roof trusses were spaced at 24" on center. The roof deck sheathing is 7/16" OSB without H-clips, and 7/16" plywood with H clips. The H-clips are observed at the apparently new plywood installed during a previous reroofing.

2. If all of the roof sheathing is to be replaced, it must be 1/2-inch plywood minimum. If rafters are at 24" on center, the 1/2-inch plywood must be installed with spacers (ply clips). (Section \*R-803.2.1, (Table 803.1 – Minimum net thickness of 1/2-inch).

**Comment:** Per IRC, Table R503.2.1.1(1), panels must be 24" wide, minimum, per footnote c) The panels are typically required to be installed with 1/8" gap or with spacers (H clips). The local amendment overrides the 7/16" sheathing thickness listed for 24" span.

3. Corrosion resistant nails or staples shall be used, four (4) nails or staples per shingle (Section \*R-905.2.6).
4. When re-roofing, all damaged roof sheathing must be replaced. New flashing shall be used where applicable (Section \*IBC-1203.2).
5. **Attic ventilation shall be as follows:** One (1) square foot of free vent area should be provided for every 150 square feet of attic. A 2 1/4 square foot gable vent, with louvers and screening, would have one (1) square foot of free vent area. The required vent area can be reduced by half (1 to 300) if half of the vents are soffit vents in the eaves and the other half are at least three feet (3') off the attic floor (Section \*IBC-1203.2).
6. **Shingles shall be installed as follows:** Slopes less than four inches (4") in twelve inches (12") but not less than two inches (2") in twelve inches (12"): Nominally

double-coverage asphalt shingles may be installed on slopes as low as two inches (2") in twelve inches (12"), provided the shingles are approved self-sealing shingles. An ice barrier that consists of at least two layers of No. 15 felt or a self-adhering polymer modified bitumen sheet (ice and water shield), applied as required in Section R-905, shall be used in lieu of normal underlayment and extend from the eave's edge to a point at least twenty-four (24) inches inside the exterior wall line of the building. Shingles shall not be used on roofs with slopes less than two inches (2") in twelve inches (12") - (Section \*R-905.2.7.1).

Comment: City of Streamwood code amendment.

#### **R905.2.7.1 Ice Protection**

Delete subsection in its entirety and insert the following:

All roofs of permanently heated structures shall have an ice barrier that consists of a self-adhering polymer modified bitumen sheet, in lieu of normal underlayment and extend from the eaves edge to a point at least twenty-four inches (24") inside the exterior wall line of the building and a minimum of twenty-four inches (24") on each side of any valley.

In email from John Peterson, Dated December 6, 2013 indicated that two layers of felt cemented together is not permitted in Streamwood.

7. A drip edge shall be installed along the edges of all roofs (Section \*IBC-1507.2.9.3).

Comment: City of Streamwood code amendment.

Subsection R-905.2.8.1 Base And Cap Flashing:

Add sentence: All asphalt shingled roofs shall have a drip edge installed along the bottom of all roof edges and along all gable ends.

**Add exception:** Where the gutter system supplies an approved flashing to take the place of a drip edge along the bottom roof edge.  
(Ord. 2011-28, 11-17-2011)

8. No permit shall be issued for new roofing or siding unless the roofing material or siding, as the case may be, on the entire structure is replaced (1-2012). Where the structure consists of multi dwelling units, the improvement for all of the dwelling units shall be replaced at the same time whenever possible. Where the covenants and restrictions on the property require the exterior of the units to have consistent colors and materials, every attempt shall be made to match the existing colors and materials. If the entire multi-family structure is not replaced at the same time, and subject to subsection D2 herein, a letter of approval is required by the other dwelling unit owners prior to the permit being issued.

Exceptions: In addition to any other requirements contained herein, permits for partial replacement of roofing and/or siding in all structures may be allowed with written approval of the building official when the following conditions are met:

- a. A siding evaluation report is submitted from ITEL Laboratories, Inc.
- b. The report shall indicate that the original product is still available.
- c. The report shall indicate that the color match is a 1 or 2 value on the siding match chart.
- d. No less than one side of the structure is going to be replaced.  
(Section\* R-325)

**Comment: The above section was amended and was put in place after the loss. The original exception read "Exceptions: Permits for partial replacement may be allowed with the approval of the building official, Ord 2008-4, 4-21-2008)." (See Southgate003808).**

9. R-325 Exterior Structures – states the following: *No permit shall be issued for new roofing or siding unless the roofing material or where the covenants and restrictions on the property require the exterior of the units to have consistent colors and materials, every attempt shall be made to match the existing colors and materials. If the entire multi-family structure is not replaced at the same time, and subject to subsection D2 herein, a letter of approval is required by the other dwelling unit owners prior to the permit being issued (2008).*

Note also:

1) Email from John Peterson to Daphne Morton (Deposition exhibit 12 to Peterson deposition) indicates "We have not issued permits for partial roofs in the past unless the shingles were less than a year or two old and the color matched well."

2) Email from John Peterson to Tony Denovo (Deposition exhibit 10 to Peterson deposition) indicates "Attached please find the building permits that you submitted. The applications have been denied based on the local building code amendment listed below.

Please resubmit the applications for the entire roof to be replaced."

5.14 This email appears to be a reply to a December 9, 2011 email from Denovo, the email then attaches inline the revised 2011 text of R325.

#### Additional Siding Information

1. All exterior wall surfaces shall be covered with an approved water repellant membrane (Tyvek) or approved equivalent. The membrane shall be installed in a complete assembly with a minimum number of seams. All seams shall be lapped a minimum of six inches (6"). Any sides or gables without sheathing require installation of a minimum of 1/2" plywood or OSB sheathing. (\*R-703.1 VOS Code) All seams, doors

and windows shall be fastened with manufacturer's approved tape. (\*VC-9-5-2-7(B))  
All wood soffit fascia and window trim materials shall be primed on all sides prior to installation. (\*R-903.5 VOS Code)

2. A Tyvek inspection is required prior to the siding being installed. Please note that 24 hours' notice is required for all inspections.
3. The address numbers shall be placed back on the house. Numbers shall be a minimum of 4" high in a contrasting color.

Before final inspection:

1. All vent caps, electrical fixtures and devices, and house numbers shall be installed.
2. All penetrations for piping or other mechanics shall be sealed with caulk.
3. Site shall be clean and free of any extra material or debris.

Siding Replacement Comments:

- 5.1.2 In our opinion, the siding was physically damaged as a direct result of the wind and hail event. Forensic Building Science detached siding on each building to verify manufacturer's identity and run numbers. There were no identifying marks on the siding found during our inspection, making verification of availability infeasible. In our opinion, the siding is no longer manufactured and due to fading, matching will be impossible requiring complete replacement of all of the siding.

The existing Tyvek can be damaged by removal of the siding. If it is not damaged, all the nail holes will have to be taped over with Tyvek tape and this then needs to be inspected and approved. Rejection of the Tyvek in this case by the building official will then require new Tyvek anyway. It is our expectation that labor to patch will exceed material and labor to install "over" the existing Tyvek and have that install inspected.

**"All exterior wall surfaces shall be covered with an approved water repellant membrane (Tyvek) or approved equivalent. The membrane shall be installed in a complete assembly with a minimum number of seams. All seams shall be lapped a minimum of six inches (6"). A Tyvek inspection is required prior to the siding being installed."**

**Comment:** The water repellent membrane is required to integrate under the window flanges on the sides and over the top at the head of the windows and doors. Contractor's option to remove windows and doors or install per Tyvek retrofit guidelines (in our opinion this is alternative design, and requires approval). It is unclear if this is acceptable to the requirements of the City of Streamwood. Detach and reset of the doors is the most straightforward way to secure approval. [See current Tyvek installation requirements].

5.2

5.2.1

**Rated Fire Walls Discussion:**

The exterior sheathing behind the siding and weather resistive barrier is 25/32" fiberboard sheathing. Codes in place at the time of the loss require that at a minimum fire separation wall on the exterior extend five feet on either side on the interior fire separation wall (dwelling separation).

We examined the sheathing at these locations and did not find fire rated sheathing on the exterior of the wall despite finding fire rated wall materials in the attic separation wall (these materials consisted of 1-layer of 5/8" gypsum board and the wall extended to the bottom of the roof deck sheathing).

The firewall extension that is required on the exterior walls is also required on the roof deck four feet into the attic assembly unless a parapet is installed. There are no parapets.

Lastly, the fire separation wall in place at the attic we inspected was water damaged and had holes punched through it. Non-rated staples were used to affix the Gypsum board to the framing. Seams were not fire caulked (taped). Gypsum in contact with wood framing was not fire caulked. The sheathing in this area should be nailed, as the code/UL rating requires nails.

5.2.2 In our opinion, repairs to the in place fire walls in the one attic we inspected will be required. This is due to both water damage and construction issues (nailing, tape). All attic assembly fire separation walls should be inspected and all similar damage should be repaired.

5.2.3 The fiberboard sheathing within and including five feet either direction of the existing fire separation walls should be removed and either FRT sheathing or Type X Fire rated exterior Gypsum or Dens-glass should be installed. UL listed fasteners will be required. Verification that this does not substantially weaken the structure's lateral force resisting system or braced wall construction will be necessary for installation of gypsum board as the allowable shear values of gypsum board are substantially different from wood structural panels.

6.0

#### **Review of Fuss Deposition:**

6.1

We have reviewed the MKA's architect Mr. Fuss's deposition specifically pages 88-93. Fuss states that his conversations with the City Building Code Official John Peterson indicated that the ordinance and permit requirements in the City of Streamwood would require complete replacement of the roofs and siding:

"The requirement, paraphrasing it, was that they were not going to allow roofing or siding to be repaired in pieces, but, rather, any permit application would be required to replace the entire structures, roofing or siding, with some exceptions they allowed for."

7.0

Comment: We concur with Mr. Fuss's interpretation and we also believe that the damage is extensive enough to warrant full replacement.

7.1

7.1.1

#### **Conclusions:**

##### **Patching in repairs to shingles**

City has indicated repair or patching in is not acceptable and will not be permitted. While patching in is sometimes financially appealing, we do not recommend it for the following reasons:

We do not advocate patching in to repair only damaged shingles. Repair (patching in) of the existing shingle would require a manufacturer's ESR and an approval of the repair from the Building Official (in the absence of a building official, a registered design professional should consider if this is acceptable, and issue a stamped and sealed repair document showing the repair).

7.1.2

Manufacturer has not been identified, making matching unlikely. Manufacturer should also be identified so their repair recommendations can be followed.

7.1.3

Damage to roof penetrations (vents, turbines, roof jacks) removal and replacement will require removal of shingles and these shingles cannot be reinstalled.

7.1.4

As a baseline reference on patching in, we reviewed material in CertainTeed Shingle Applicator's Manual, 10<sup>th</sup> edition for information on replacing shingles. We have found no other manufacturer who publishes repair or patching in instructions. These shingles are not identified as CertainTeed.

7.1.5

We note that the Donan 2009 report quotes material from the CertainTeed Shingle Applicator's Manual on shingle replacement (patching in). The Acknowledgement section of this report cites the CertainTeed's Shingle Applicator's Manual – Seventh edition.

7.1.6

Forensic Building Science reviewed the current edition of the Shingle Applicator's Manual (10<sup>th</sup>, published in 2011), and the instructions do not appear to have changed. (at the time of writing of the Donan report in 2009, the eighth edition was clearly available and should have been consulted).

These repair instructions indicate significant labor and additional shingles will be removed beyond the number of damaged shingles (3x the damaged shingles, two courses above the damaged shingles), and the installation of two specific kinds of roofing cement as acceptable. If current manufacturer installation guidelines for patching in can be obtained, we would consider patching in appropriate, but all wind-damaged and hail damaged shingles would have to be replaced. In our opinion the cost of patching in is impractical in light of this repair scope (although this repair scope is not associated specifically with this make of shingles).

7.2

While replacing individual shingles is financially appealing, there are multiple technical problems with such an approach that we cannot recommend "patching in." These include:

- Manufacturer has not been identified, repair cannot follow manufacturer's instructions, violating code.
- Removal of hail damaged and wind damaged individual shingles will be required.
- Removal of adjacent shingles or breaking sealant of multiple adjacent shingles will be broken and will require resealing (e.g. CertainTeed indicates three courses to be removed for each replaced shingle).



- Sealant will have to be approved by manufacturer (new and original shingles) and building official.
- Sealing holes from fasteners removed will be required to protect underlayment (e.g. CertainTeed, although CertainTeed recommends re-using the nail holes—a suggestion we find impractical as firstly, we would want a nail into relatively virgin wood to provide normal withdrawal values, which would require altering coursing, or nailing high/low or offset and then filling the existing nail hole in the underlayment with sealant). Altering nail locations is acceptable to some shingle manufacturers but verification will be required.
- Comparatively high labor costs.
- Matching may not be possible.
- Repair does not appear to be tested per ASTM D6381, D3161, or D7158.
- Underlayment cannot be damaged during repair.
- Local amendments forbid patching in.
- Roofing contractor may refuse to warrant their work, or may be unwilling to perform the work without a waiver of warranty by the Owner.

We attribute this damage to the April 5, 2010 storm event. Damages include hail bruises, penetration to the mat and mat exposure to the surface of shingles. Damage was typically directional. Shingles that measured thicker using a shingle gauge at buildings #2, 4, 8, 12, 17, 23, 29, 33, 36, 47, 48, and 49 typically fared better than the thinner shingles. In our opinion, the roofs on buildings #2, 4, 8, 12, 17, 23, 29, 33, 36, 47, 48, and 49 sustained less damage due to the type and thickness of the shingle, but damage from the storm event was observed. In our opinion, all of the roofs sustained damage warranting full replacement.

7.3

The hail event damaged and dented the lighter gauge metal and plastic appurtenances (vents, etc.) on the roofs of the buildings. Damage to roof vents in particular, was extensive and typically involved both sides of a roof slope exposure. We attribute this to the location of the vents at the top of the roof. We attribute this damage to the storm event. These damaged components require replacement. In order to do this work, additional shingles on building # 2, 4, 8, 12, 17, 23, 29, 33, 36, 47, 48, and 49 will be required to be removed adding to the matching issues already presented.

7.4

The hail event damaged and dented the downspouts and some gutters on the buildings. We attribute this damage to the storm event. Damaged gutters and downspouts require replacement, which will involve shingle disruption if the gutter is also used as a flashing.

7.5

The damage is randomly distributed across the roofs, which is typical of hailstorms. Some exposed roof flashing was impact damaged by the hail. In our opinion, the damage is significant, affecting the majority of the roof areas. In our opinion, the roofs on the buildings were installed correctly and were performing adequately prior to the storm event. There were no reported leaks prior to the storm event that we are aware of.

7.6

The existing roof deck sheathing is a mix of 7/16 inch OSB and plywood. Reuse of the roof decking in place may require the installation of additional bracing at panel ends that currently do not have H-clips. To accomplish this, removal of sections of roof decking

would be required. As an alternative blocking could be added on the interior of the attic at the panel end joints that are not supported.

Replacement of roof will involve removing all flashing, including at roof-wall intersections to either inspect for corrosion and secure approval from the building official to leave in place / reinstall, or to remove and replace it. Removal (or inspection) of the flashing, which extends up the wall, will require removal of additional siding.

7.7

Some soft spots in the roof deck have been noted on the various buildings. It is our expectation that some of the sheathing has become wet and water damaged as a result of the storm event. This material will have to be replaced.

7.8

In addition, all known manufacturers of Ice barrier do not permit installation over existing ice barriers and the existing ice barrier is expected to be damaged from the shingle removal process. If removal of the ice barrier damages the sheathing in the eaves and valleys, this sheathing will have to be replaced. Per communication with John Peterson, City of Streamwood, 1/2" plywood (with H clips) is the minimum sheathing acceptable to Streamwood. This will create a 1/16" thickness difference between existing 7/16" OSB and 7/16" plywood in place and the new thicker 1/2" plywood replacement material. Given this will create a disturbance in the setting elevation of the shingles, any roof with damaged sheathing will have to be fully replaced to provide a level, flat surface for shingle installation.

7.9

7.10 Vinyl siding, window and door wrap, fascia wrap and support post wrap was damaged on every building. The damage was sporadic in nature, typically on two sides and favored the main direction of the storm event. In our opinion the damage caused by the storm event will require complete replacement of the vinyl siding, metal wrap and a number of window screens.

7.11

Impact damage to AC coils caused by hail will require replacement of the coils. Replace with OEM coils. If OEM coils are not available, replace units.

7.12

Damage to the fire separation wall in the one attic inspected requires replacement of parts of the wall. Inspection of the exterior wall sheathing and roof deck sheathing within five feet of the fire separation wall uncovered that the sheathing materials does not meet the UL or code requirements for a 1 hour rated assembly. Removal of the wood non rated material and replacement with a fire rated assembly material will be required. Penetrations in this area are not allowed, either on the roof or the wall.

7.13

Installation of a continuous weather barrier is required on the exterior walls by the City of Streamwood. In our opinion, this will require all exterior doors and windows to be detached and reset to follow compliance with this requirement. Fenestrations should be verified against energy code before they are reinstalled.

7.14

#### Authors Statement:

This report was co-authored by Brian Johnson P.E. and Thomas Irmiter, president of Forensic Building Science. Both Mr. Johnson and Mr. Irmiter conducted site visits to the property and performed inspections. Mr. Johnson contributed to the causation analysis of

the report. Mr. Irmiter contributed to the scope of repairs and specific industry standards and requirements within the building codes and ordinances. Both Mr. Johnson and Mr. Irmiter reviewed each other's contributions to this report.

### **Requirements / Recommendations**

Based on the findings during the limited investigation we recommend the following steps be taken.

8.0

In our opinion, these buildings meet the definition of townhouse as adopted and amended by the City of Streamwood.

Note: Townhomes generally can be permitted under either the IBC or the IRC, but are most commonly permitted as IRC.

Matching and repair requirements to exterior walls under R325 (local ordinance), generally requiring replacement on one side only of the building siding, and documentation that the original siding is still being manufactured and has been examined by ITEL to be a 1 or 2 rated match in color. The amendment is silent on roofing, which in our opinion means such an 'ITEL' patching pathway to approval does not exist for roofing.

Building separation requirements under R317:

Townhouses (R317.2) amendment requires having a two hour wall separating the units. The local amendment requires this separation wall to be built of masonry or concrete. The existing wall is wood trusses and light framing (dimensional lumber).

In our opinion, any water damage to the fire-separation wall (which is extrapolated to be Gypsum board throughout the complex based on the construction in 209 Acorn Drive), will require replacement of the gypsum board (See Gypsum Association GA-231-06, which states)

*"IF THERE IS EVER A DOUBT ABOUT WHETHER TO KEEP OR REPLACE GYPSUM BOARD THAT HAS BEEN EXPOSED TO MOISTURE -- REPLACE IT."*

At a minimum, since these sheets are stapled, not nailed, and are not taped, the replacement sheet will have to be 5/8" type X gypsum and the full area will require code nailing, mudding and taping (this is, relatively speaking, creating a 1 hour wall where a 2 hour wall is currently required, we have been unable to contact the building official regarding this matter to date). It is likely the building official will call for a second layer of 5/8" gypsum board to be added to produce an assembly closer to a 2 hour wall. (This 2 hour provision matches the IBC Table 706.3.9 and the local IRC amendment, minimizing the difference between the IRC and IBC).

There are no revisions or deletions to R317.2.2 Parapets.

Due to the infeasibility of constructing a parapet for these buildings, we would suggest pursuing the exception. This will require FRT sheathing for 4'-0" from the dwelling separation on roof sheathing. The alternative (Type X gypsum installed below the roof deck) is disregarded as excessively labor intensive on existing construction.

We disregard Option 3 under R317.2.2 as this requires complete deconstruction of the wall sheathing at the roof height jump; furthermore, this option appears to occur within the dwelling

unit, not at the separation between occupancies.

In our opinion, there are deficiencies in the fire wall construction separating units that if roof sheathing replacement occurs will be mandated to be amended by the building official.

Treatment and existing construction at the fire separation wall that runs the ridge of the buildings is similarly constructed without taped joints and with staples. There are vent penetrations at the ridge which are not allowed for 4' from the wall. These items will not be allowed to continue during roof replacement, requiring sheathing replacement in minimum 24" widths and extending 4'-0" from the ridge line. This material should be FRT sheathing unless gypsum board is pieced under this area. (See Figure 23, Southgate 209-215 Acorn Drive Photo Log).

Also note perpendicular (exterior) walls at dwelling separations are typically required to be fire rated 1 hour. When siding is removed from this area, verify Type X gypsum with a weather resistive barrier is present for 5' in each direction (See Table R302.1). Windows in this area are not permitted (within 3' of the separation), and are limited to 25% of the wall area between 3' and 5' from the separation. If mandated, the most reasonable approach would be to replace with a FRT sheathing on the exterior if an architect can identify a fire rated wall acceptable to the building official.

City of Streamwood amendment 905.2.7.1 deletes two layers of cemented roofing felt as an option. A polymer modified bitumen sheet is required.

- 1) Remove all layers roofing to the deck.
- 2) Remove sufficient siding at the roof-wall jump for the building official to inspect the flashing, or remove sufficient siding this location to replace flashing.
- 3) Note: Removal of wall siding to examine and secure reapproval of flashing may require additional flashing (i.e R903.2.1 at wall and roof intersections (i.e. a kickout flashing).
- 4) Secure approval for re-use of existing sheathing (OSB and plywood is expected) for installation of new underlayment from Building Official.
- 5) City of Streamwood requires ½" plywood with H clips for any new sheathing or replacement sheathing. Current roofs have 7/16" OSB/Plywood mix with missing H-clips in some locations. Replacing any roof sheathing will create a 1/16" thickness deference that will have to be acceptable to the shingle manufacturer. We are not aware of any roofing manufacturer that finds this acceptable, thus any sheathing replacement will require replacing all sheathing on the roof to the ½" CDX plywood minimum.
- 6) Verify existing ventilation meets current code. Install additional vents as required to meet code requirements and shingle manufacturer requirements. Verify vapor barrier in attic, otherwise expect to provide 1/150 area in ridge vents or louver/turbine vents, per City of Streamwood, also verify requirements of shingle manufacturer and conform. Note: No penetrations are permitted in the 4'-0" area against the fire separation / dwelling separation wall. These penetrations must be removed/sealed up with sheathing replacement suggested (See JOL Photos from 8-21-13).
- 7) Install code compliant (and/or shingle manufacturer required) roofing underlayment per City of Streamwood. Include installing minimum 5/8" type X fire rated gypsum board on underside of roof deck and ledger, extending out from fire wall 4 feet into attic (per exception to R317.2.2) or replace 4 feet of roof sheathing from the unit separation with

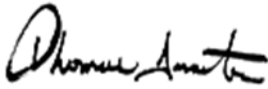
- FRT sheathing). Fire caulk all seams and intersections with wood members.
- 8) Install code compliant ice dam protection membrane (and/or asphalt shingle manufacturer required) to replace existing. Extend 24" horizontally from inside face of interior wall (2006 IRC R905.2.7.1), unless local code and manufacturer does not require. **Note: Install over existing ice dam protection membrane must be acceptable to new membrane manufacture (i.e. in the ESR). We have not found any manufacturer that allows this, thus removal of any previous ice dam protection membrane will be required.** If the roof sheathing is damaged by removal, it will have to be replaced. Ice protection membrane is generally slippery and some manufacturers (Owens Corning Weather Lock G) recommend fall protection per OSHA 20 CFR 1926.500).
- 9) Replace roof jacks, vents, and other roof items (more cost effective than removing, securing approval from Building Official to reinstall).
- 10) Replace roof flashings, which is more cost effective than securing re-approval for reinstallation of non-damaged materials.
- 11) Install metal valleys where applicable [2006 IRC R905.2.8].
- 12) Replace damaged gutters and downspouts. Review gutter and downspouts location and sizing per SMACNA Asphalt Sheet Metal Manual or other similar reference. Such a change will likely be a minor cost. We do not recommend draining upper roof areas onto lower roof areas.
- 13) Install minimum 30-year standard three-tab shingles. Verify with Building Official that class "A" shingles are not required.
- 14) **At roof wall intersections:** Verify weather resistive barrier the full height of this wall. Where siding is removed to inspect step flashing for reuse or replacement, a weather resistive barrier must exist. If a WRB is absent, due to overlap requirements (6" at joints, R703.2) where wall hits a vertical corner, this provision forces removal of vertical corner to wrap weather resistive barrier to next side, remove vinyl and continue, due to the construction of these units, removal of all siding will be required to install the WRB. Note: Where siding was removed a weather resistive barrier (Tyvek) was found, so this condition may not exist.
- 15) Remove all vinyl siding fascia, rake edge, window and door and other metal wrap.
- 16) If required, remove existing weather barrier.
- 17) Install Tyvek weather resistive barrier per manufacturer's installation instructions, review retrofit install document with building official. If acceptable, follow that document, if not acceptable, remove windows and doors, verify they meet energy code, install flashing per Tyvek and reinstall windows and doors.
- 18) If required, remove nonrated wall sheathing at unit fire separation walls. Install approved 1 hour wall (generally minimum 5/8" type X gypsum board with UL rated fasteners extending out from fire wall five feet in both directions, or FRT sheathing to match existing sheathing thickness). Note: FRT sheathing matching existing nailing pattern and thickness is suggested. Installing gypsum sheathing in this area reduces strength of the building's "braced wall" construction and will require analysis by an engineer.
- 19) **Energy code requirements have not been reviewed. Scope of work for this project is structural only. Integration of existing building systems with vapor retarders, application of sealants, flashing and other items are the responsibility of the contractor.**
- 20) Alternate construction techniques may be acceptable, provided a licensed design

- professional approves and signs and stamps plans and or shop drawings for these repairs. Means and methods are the Contractor's responsibility.
- 21) Stability during construction is the responsibility of the Contractor. Structure as detailed is intended to be stable once all sheathing and fasteners are in place.
  - 22) Conform with any special inspection and testing schedules issued by the engineer.

Discovery is ongoing. Additional testing and inspections may need to be performed and additional and/or supplemental information and opinions may be contained in future reports issued by Forensic Building Science, Inc. This report is the exclusive property of the client noted previously and cannot be relied upon by a third party. Copies of this report are released to third parties only by written permission of the client.

Please feel free to contact our office should you have any questions or need additional information.

Respectfully submitted,



January 7, 2014

Digitally Signed

Date

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